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The Physiotherapy Review

Vol. XIII No. 5

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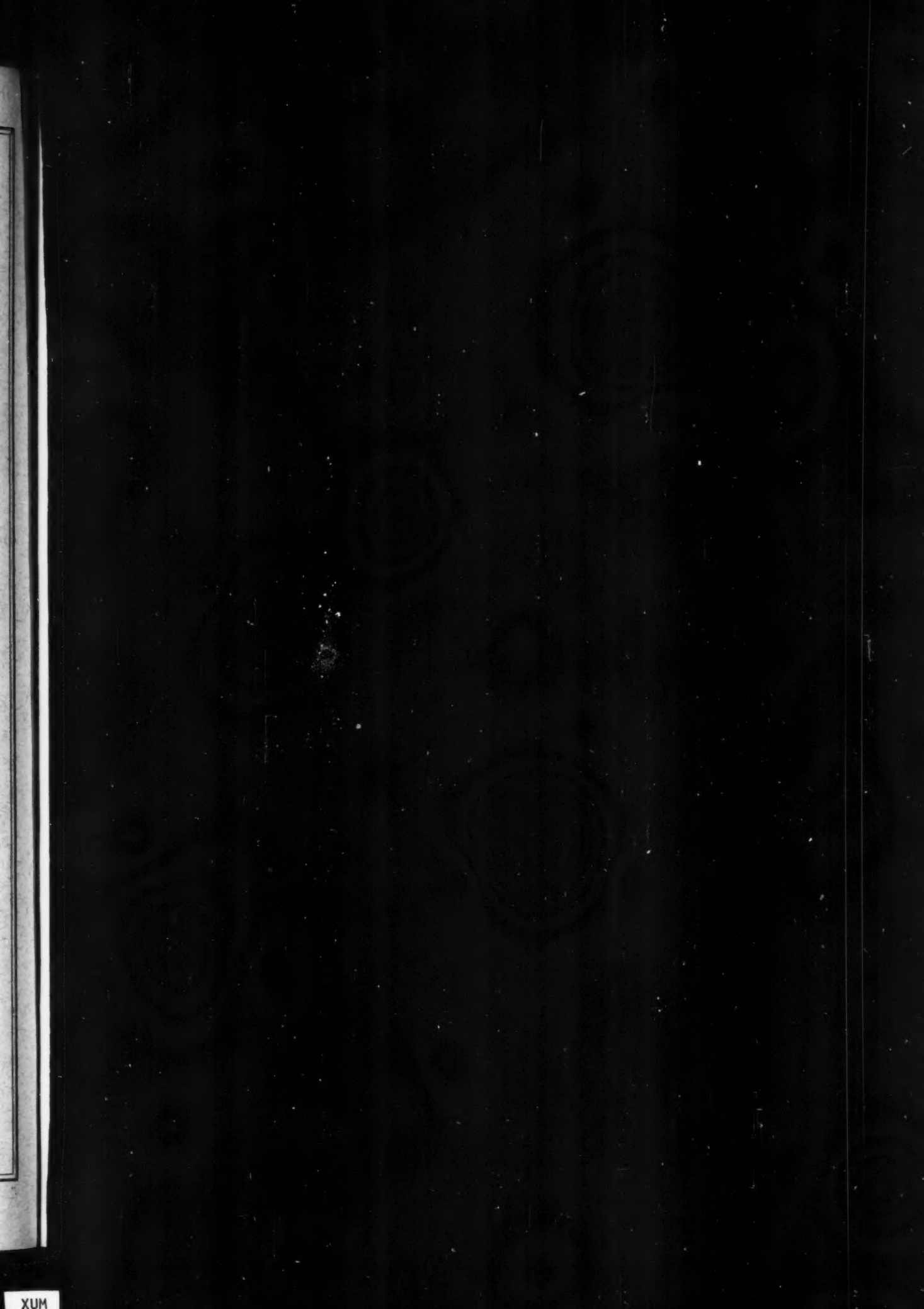

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Some Observations on the Kinetics of Paralytic Scoliosis

By Charles LeRoy Lowman, M.D., F.A.C.S.

Observing the corrective work of many technicians in the treatment of paralytic cases I have noted their general tendency to be attentive to the extremities more than the trunk.

Naturally, since the use of the feet and legs for walking and the improvement of hand and arm function is of such prime importance it is very easy to overlook imbalances of trunk muscles, especially when they show but little obvious involvement.

At the Orthopaedic Hospital in Los Angeles, we have conducted a survey of the scoliotics registered during the past ten years, and have given especial attention to working out the relation of the abdominal musculature to trunk deviations, which has impressed upon us the inadequacy of our muscle tests when examining paralytics.

In handling the extremities the attention of the director or technician centers especially on the intrinsic muscles, and their under or over-action is easily demonstrated, tested and recorded with a good degree of accuracy.

Because of this, exercises for these specifically involved intrinsic muscles and their opponents are given. The importance of extrinsic muscles which act to fix the foundation of extremity movement being more obscure, is not thought about much and hence does not have adequate or accurate treatment for correction of weakness or the overaction of opponents.

The early poliomyelitis case, for instance, begins his exercise lying on the table or in bed and the position and body weight acting to stabilize the shoulder or pelvic girdle may be ample to allow proper fixation for arm and leg muscles. This still further tends to throw the technician off guard, especially when her records show steady gain in the intrinsic muscle groups. The medical attendant scrutinizing these records and usually noting continued improvement may be satisfied; the patient and the family may be elated at the increase of power and movements the patient can demonstrate; weeks lengthen into months; the patient is at first allowed up in a wheelchair; then begins to stand and walk, and shortly thereafter there is noted a beginning curving of the spine and tilting of the pelvis.

Long ago our work under water made us at once conscious of the very great difference between such treatment and the muscle training work of the gymnasium. The essential difference is that in free or partly free floating movements the action of the extremities is interfered with in direct proportion to the ability of the trunk stabilizers to balance the pelvic girdle on the thorax and shoulder girdle to the spine and thorax.

The various fundamental positions needed for a given case in the pool had to be accurately worked out with especial emphasis on trunk stabilizers which were extrinsic to extremity action. This showed up especially the reasons for scoliosis beginning to develop as it showed us the existing imbalances.

We also had our curiosity stimulated greatly by watch-

ing curvatures develop in cases previously straight, while they were still in recumbency. Gradually we incriminated certain muscle groups, notably the abdominals and the anterior and posterior trunk twisters.

We noted two cases especially with beginning curvature, in whom there was only a slight involvement of scapular muscles and half the abdominals,—in one the upper recti and obliques and the other lower recti and obliques. Attempts to turn slightly and reach to the bedside table caused contraction of the viable portion of the abdominals, moving the umbilicus upward in one instance and downward in the other. This showed that when the serratus magnus pulled on its attachment to the rib cage there was an effort made by the corresponding obliques abdominalis to hold the rib cage steady, but with one portion of the obliques paralyzed and the central pull of the recti likewise out of order, stabilization to the opposite ilium could not be attained.

If we consider the body as a cylinder, or rather a column which can turn on a spinal axis, we find that there are certain muscles acting in sequence which serve to twist or oppose its twisting when action from one side of the pelvis or shoulder girdle takes place.

The mechanism is somewhat as follows from above downward: from dorsal spine, pectorals, serratus magnus, abdominal obliques to central aponeurosis and symphisis and lower opposite obliques to the opposite ilium. The reverse action takes place through the latissimus dorsi, teres major and minor, rhomboids, lower trapezius, transversalis and quadratus lumborum. The latter does not directly twist, however, but acts as a stabilizer for the others. Working in opposite pairs, one set carries, for instance, the right shoulder forward and around while the opposite group carry the left shoulder backward, thus twisting the trunk on its axis. When the head is included, the sternocleido of one side and trapezius and other neck muscles of the opposite side assist.

The action of these groups is very much more evident when attempting to turn over in the water. It is necessary in this case to carry one part after the other past the dead center line in order to shift weight of the parts enough to overcome gravity or the resistance of buoyancy. It can readily be seen then that if these long chains of twisting muscles are weakened in different segments there must be a rotatory imbalance which involves the thorax and spine. For instance, visualize a right dorsal, left lumbar scoliosis, right rhomboids weak and some abdominal weakness. The serratus and pectorals intact. The scapula is carried forward by the serratus which becomes shortened; the pectoralis major draws the arm inward to the chest and the whole weight of the shoulder and arm mass lies against the chest wall anterior to the rib angle. Efforts at using the hands and arms in pushing down on a bed, chair or crutches activates the latissimus, which makes still further lateral pressure on the side of the rib cage anterior to the rib angle and tends to buckle the ribs back still more. The mechanism for forming the hump along the rib angles is thus evident, or at least a strong contributing factor. When we appreciate that the diaphragm is an asymmetrical muscle, as Jansen points out, and the quadratus lumborum is stronger on one side than on the other, with the asymmetry of stabilization due to abdominal involvement, we see what the rotation deviations are due to. When pelvic tilts both lateral and anteroposterior occur from muscle imbalance in quadratus lumborum, external abdominal obliques, transversalis, sacrospinalis and psoas, compensatory adjustment of all structures above the foundation are sought in order to get to the point where some purchase or fixation can be accomplished. For a description of some of the tests for abdominal muscle imbalance you are referred to the October, 1932 number of the "Journal of Bone and Joint Surgery, pages 763-771.

Summary:

1. You may have fairly good leg and arm muscles but they become ineffectual in direct ratio to the involvement of their extrinsic stabilizers.
2. Early testing of body muscle imbalance will uncover the causative factors of paralytic scoliosis.
3. Early treatment and special exercises may avert insidious and later severe back deformities.

2417 South Hope St., Los Angeles, Calif.

The Problem of the Physically Handicapped Child

By H. Waldo Spiers, M.D.

The lot of a cripple down through the ages, has been an extremely unhappy one. We know that before recorded history, in tradition he was thought of as a demon possessed of the devil; a thing to be avoided and scourged out of one's sight. He was sacrificed to the Gods of the wind, and the rain and the seasons. He rarely lived long. Death by intentional accident, starvation or worse, was his destiny. Recorded history shows him to have been the beggar, the unclean, and the untouchable. He lived on the fringe of society. However, these facts were not sufficient to prevent, in many cases, a brain keen as his fellowmen, sharpened by his necessities, from becoming a powerful influence in society. Many cripples were jesters of the kings court, and were also practically the prime ministers in their kingdom. One does not have to go far for illustrations. The present Chancellor of the Ex-Checquer of the Bank of England, was born a cripple. He gets about only with the aid of two crutches and an attendant. Steinmetz, the electrical wizard, was repulsive from his deformities but no brain stands out with such brilliance as his in his chosen field. It need hardly be noted that the President of the United States is a cripple.

The knowledge that certain crippling deformities could be corrected, dates back only about three hundred years. A man by the name of Andre, a Frenchman and gymnast, who was somewhat of a charlatan it is said, found that by muscle development and manipulation, many times, a crooked spine and a crooked limb could be straightened. He developed an institution outside of Paris at which, it is recorded, he often had three thousand patients working in the open air gymnasium. He coined the word "Orthopedic" from the Greek, meaning "straight child." The surgeons of today who specialize in the corrections of deformities (bone and joints surgery) are known as Orthopedic Surgeons.

Surgery designed for the rehabilitation of one physically handicapped, dates back only about one hundred years. Little, an English surgeon, conceived the idea that a shortened tendon could be lengthened. He operated upon the Heir to the Throne of a Belgium Kingdom successfully and established for himself the name of "the

father of orthopedic surgery." Orthopedic surgery developed slowly. Its major advances have been made only in the last thirty years. Our generation covers most of this. At first the crippled child had no opportunity for surgery except in certain selected centers. In this country, they were in Philadelphia, New York and Boston. There, there were a few men working with the physically handicapped. They worked in hospitals developed usually by charitable or religious institutions. It is obvious that their work could cover only a very trifling number of the cripples which existed. The specialty developed from these few centers, and today in nearly all cities there are surgeons equipped by training and experience to care for the crippled child. Along with the surgeon, institutions have grown up equipped and prepared to educate and rehabilitate the physically handicapped.

It is estimated that there are from two to four minors crippled per thousand population in the average community. Los Angeles and vicinity, could be expected to have six to eight thousand cripples below the age of eighteen. It is an interesting and definitely established fact that there is a human tendency to conceal the cripple. In every place, where there has been a thorough survey of the population, this fact has been clearly demonstrated. The proportion of the known cripples to the actual number, frequently runs as high as one to five.

The nature of these crippling deformities and the possibility of their cure and relief is interesting in itself. Infantile Paralysis leads the list as the cause of crippling deformities. Spastic paralysis follows. Rickets, tuberculosis, congenital deformities, club feet, dislocated hips, harelips and cleft palates, come next. There are a certain number of accidentally acquired deformities, burns, amputation, etc. About sixty percent of all cripples, can be made wholly self supporting and about twenty percent made partially self supporting. Of the remaining twenty percent, most of these are those, whose minds as well as bodies have been crippled. All of the infantile paralysis cases can be improved and if cared for early, many of them can be cured. Most of the spastic cripples, can be improved somewhat. In this group, there are a fair number whose mind is affected and whose prospects for recovery is bad. Sixty to eighty percent of the congenital hips can be cured. If taken early, all of the club feet can be reasonably corrected. Most of the cleft palate cases, can be largely corrected.

Preventive medicine has a broad field here as in other diseases. Much is being done. Poliomyelitis undoubtedly is an infectious disease. We now have a serum which if given early enough, prevents or lessens paralysis. I feel that some day the disease will be conquered. Rickets is being largely prevented by our modern knowledge of diet and sun therapy. Tuberculosis is no longer the scourge it was. The incidence of tuberculosis of the bone, is gradually being diminished—and so down the list. The proverbial "ounce of prevention" is worth here as elsewhere, many "pounds of cure."

The question now arises; why care for the cripple? It seems to me that there are two unanswerable reasons. First:—the humane reason. We believe that every child has a right to happiness. The uncared for cripple has no chance to gain this birth right. Second:—From a purely selfish and financial standpoint, if it is evident that by the expenditure of a few hundred dollars, a cripple can be made self supporting, the State has thus gained a tremendous return upon its investment. It has been shown that the average additional expenditure necessary for such physical rehabilitation, is about four hundred dollars. How little this seems compared with a life time of economic dependency. A dependent cripple causes the economic loss of the earning power of three individuals; one, the cripple himself, second, his attendant, and third, the bread winner for both. The State saves thousands when it returns a cripple to economic independence.

The part that the Rotary Clubs have played in the constructive effort toward giving the physically handicapped a chance, has been a very great one. "Daddy Allen" is the father of this movement. At Elyria, Ohio, through his Rotary Club and later through the Rotary Clubs of the State, a movement was begun whose impetus is still most powerful. Ohio organized for the care of her cripples much the same as she organized years ago for the education of the youth. Following Ohio's lead, other States have done the same. In California, more than six years ago, the same movement was fostered, backed by the Rotary Clubs. To the San Francisco Club must go the credit of a law that was put on the statute books which gave the crippled child the right to his opportunity. Purposely or by accident, this very excellent statute left the initiating of a movement to each individual community.

There is nothing in this law which seeks out the cripple or places him into the routine for his care. The Service Clubs of Los Angeles some two years ago, decided that here was an opportunity to do a constructive thing for their community. Rotary sponsored it, but the Optimists, Kiwanis, Lions, Exchange, in all about fourteen Clubs joined in. The Parent Teachers Associations in the County and City Districts, came in whole heartedly on the organization. Last March, a full time secretary was employed. The job of the present Los Angeles Crippled Children's Society, is to see that the law functions. There are many problems, technical, diplomatic and political that have prevented this law from operating in Los Angeles County successfully up to the present. The Los Angeles County Crippled Children's Society through its forty odd committees and through its Service Clubs, Parent Teachers Associations and in the welfare departments, are ironing out these difficulties. Within the past months, the office of this Society has seen the program develop and now a limited number of the crippled are beginning to be certified and sent through channels for their care.

It is interesting to note that in our great State, the indigent seem to have rather generally received some sort of orthopedic care where needed. It is the great middle class, the ones who can or who wish to pay something, who need the service. Out of the twenty four who have been certified recently, all but two could pay something. Eleven will pay back in time all the funds expended and eleven will pay back a part.

I conceive this movement to very closely parallel our educational system. There is no argument that our children have the right of common school education. Our State actually insists upon it. There seems to be no argument that our cripples should both have their education mentally and their rehabilitation physically as far as is reasonably possible to do so.

We must see that the cripple is found early. His chance for rehabilitation is greatly improved when treated scientifically at an early stage. We must see that he gets into the routine of his care, treatment, and education, and we must see that once he has been trained to fill his place economically in the life of a community, that he has this opportunity. Here particularly is another field for the Service Clubs. The cripple though prepared to function successfully in society, becomes an industrial hazard under our laws. The employed hesitates to accept such into his employ. We must see that this situation is changed either by sentiment of the community or in the statutes of our State because obviously

it is of little avail to find, treat and train our cripple, if when this has been completed, he still must remain in that unhappy state of unemployment.

How does the physiotherapist fit into this program? Or, I might say, how is such a program going to function without skilled and trained physiotherapists? Frankly, it will not. Surgery may be the brilliant, the spectacular part of the reconstruction program, but the every day, every week, every month and even years of steady directed physiotherapy must follow many of these cases, or otherwise, surgery will go for naught. Just to be able to massage, to turn on an electric light or current, to give a few exercises, or to manipulate a little, is not enough. To be successful even to a degree, the physiotherapist should have a broad general education. At least she should be a high school graduate and far better some of the first two years of college. She should be grounded in anatomy, physiology, biology, physics, chemistry, physical education and physical therapeutic methods. Not only should she know the theory, but should have a broad clinical training combined with a social service and nursing background. She should know somewhat of vocational training too. It should not be a three to six months course. I think of it as at least a two year, or better, a three year course of honest preparation.

You are in a field as honorable and worthy and as indispensable as the nurse is to the doctor. In a way, you are pioneers on this West Coast. A few training schools are developing. Associations for mutual study and benefit are springing up. If you will keep your feet on the ground and your vision broad, you will go forward. I congratulate you on your progress and wish you continued success for the future.

2007 Wilshire Blvd., Los Angeles, Calif.

Remarks on the Motions of the Shoulder Joint

By LeRoy Abbott, M.D.

I am glad to have this opportunity to speak before your Association because the physiotherapist and Orthopedic surgeon so often meet on a common ground with a common purpose, this purpose being the restoration of function where disability has arisen from defects, injuries, or infections of the articulations. It is for this reason that I wish to make some remarks on one of the major articulations, namely, the shoulder joint.

In this joint Nature has provided us with a mechanism permitting a free range of movement in all directions, flexion, extension, rotations, circumduction, and abduction. Not entirely satisfied, apparently, with the movements of the shoulder joint proper, the scapulohumeral articulation, she has become even more liberal by adding a second set of joints at the inner and outer extremities of the clavicle through which the scapula moves upon the thorax. It is only by this system of joints that the arm can be brought into full abduction through an arc of approximately 180 degrees. It is about the mechanics of this movement of abduction that I wish to speak particularly this evening.

In the past it has been taught, and even at the present time it is still being taught, that the movement of abduction is carried out by distinctly separate motions of the scapulohumeral joint and of the scapula moving on the thorax. The beginning of abduction takes place at the scapulohumeral joint by action of the supraspinatus muscle. At an angle of about 30 degrees the deltoid moves the arm to right angle abduction, again at the scapulohumeral joint. Here the motion of the scapulohumeral joint ceases and the arm is carried from the horizontal to the vertical by means of the trapezius and serratus muscles acting on the scapula. That this teaching is a fallacy can be readily appreciated by observing the movements of the lower angle of the scapula during abduction of the arm and with the aid of x-ray plates taken with the arm in various degrees of abduction. If the examiner will stand behind the subject and ask him to abduct his arm he will see and readily feel the lower angle of the scapula move momentarily toward the spine. Almost immediately this is followed by an outward swing of the scapula as the elbow moves away from the side. This motion of the scapula is continued until abduction is complete. Concomitantly with the movement of the scapula there is motion at the scapulohumeral joint through the combined action of the supraspinatus and deltoid muscles. From the examination of the roentgenograms it will be seen that during abduction of the arm the articular surface of the glenoid is tilted so as to face more outward and more upward as abduction increases. This permits the large, incongruous head of the humerus to utilize its articular surface to the fullest extent. The following x-rays show what movements occur through the scapula and scapulohumeral joint during abduction.

These facts are of importance in diagnosis as shown by the following examples: In rupture of the supraspinatus tendon, an injury commonly unrecognized, movement of the scapula early in abduction will show an increase in the amplitude of its arc of motion as compared with the arc of motion on the opposite side. There is a disturbance in the rythm of movement during abduction and this, with other clinical findings, should aid materially in establishing a correct diagnosis of the lesion. In mal-united fractures of the upper end of the humerus the range of abduction is permanently lessened because of a change in the relationship of the articular surfaces of the head of the humerus and glenoid process of the scapula. In many such instances the head of the humerus is united to the shaft of the bone in a position of abduction and rotation so that a half or more of its range of abduction has been utilized before the elbow is moved even a few degrees from the side. In such cases stretching and exercise will fail to change this arc of motion because of deformity. Yet we see a number of these patients sent to the physiotherapist for treatment. By more careful clinical examination and x-ray plates these patients can be saved from needless and useless treatment, and the conscientious physiotherapist cannot be held responsible for failure to restore motion to joints so affected.

There is one other point concerning abduction which is worth noting here. A full range of abduction of the arm can only be secured by external rotation at the shoulder joint. If you stand with your arm at the side and then abduct it until it lies next to your head you will find that the external condyle of the humerus is facing forward and outward at the beginning and almost directly back-

ward at the end of the arc of motion. Again, if you will hold both arms in internal rotation and then attempt abduction, the limit will be reached at the horizontal. This is due to the greater tuberosity of the humerus impinging on the acromial process of the scapula and the acromioclavicular ligament at right angle abduction. By external rotation the greater tuberosity of the humerus passes backward and a free right-of-way to full abduction is thereby secured.

This is of significance to the physiotherapist and surgeon. Many times we see patients with a restricted range of abduction and rotations due to inflammation of the subdeltoid bursa. As you will remember, this bursa lies between the acromial process above and the greater tuberosity of the humerus below. Therefore in such cases restoration or full abduction can only be secured in conjunction with restoration of rotations.

The physiotherapist is called to treat many shoulders showing a restricted range of abduction. This limitation may be due to:

1. Paralysis of muscles.
2. Adhesions about the joint.
3. Mal-united fractures.
4. Inflammation of the joint which is sensitive.
5. Destruction of the joint surface with complete or incomplete ankylosis.

To give proper treatment it will be necessary for the physiotherapist to examine patients carefully in order to establish in her mind the cause of the lack of motion. She should be interested in examination and x-ray plates in order to increase the scope of her endeavors. She should be able to recognize a limited range of motion which is due to sensitiveness, adhesions, or bony block.

I would make a plea here for examination and treatment of shoulder joints with the patient in recumbency, for in many instances it will be found that an unexpected range of motion is present when the joint is relieved from the strain of gravity. Further, more rapid improvement is noted where active, resistive exercises are employed rather than mere passive stretching. When passive stretching is used, however, fixation of the scapula can best be secured by a strap passing over the summit of the affected shoulder and the tuberosity of the ischium on the same side.

In closing I would emphasize the importance of complete rest as a valuable therapeutic agent in the restoration of joint movement. We have all seen the patient treated by ill-advised massage and passive movement show increasing stiffness of the affected joint. A period of rest in such cases is often followed by an increased arc of motion. Therefore judgment formed by the mutual cooperation of the physiotherapist and the surgeon will not only add to the interests of both, but a plan of treatment will be formulated for the earliest possible restoration of function in some of these more difficult conditions affecting the shoulder joint.

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Fractures About the Elbow Joint

By Leo S. Lucas, M.D., Portland, Ore.

Fractures about the elbow joint are nearly always serious, and require special care and consideration by the attending surgeon. Under the best attention they often lead to disaster, not only to the patient but to the physician's reputation in the community. These fractures often result in impaired function of the elbow, loss of motion, deformity, partial or complete paralysis of the hand and forearm, Volkmann's Contracture and myositic ossificans. The important factors in the treatment of these fractures is: First, elapsed time between the injury and the setting of the fracture; second, accurate anatomic reduction and intelligent care the first 24 to 72 hours; and third, proper immobilization followed by careful nursing and intelligent physiotherapy.

The elbow joint is made up of three bones—the humerus, the radius, and the ulna, which are joined in such a way as to make three joints; that between the humerus and radius, that between the humerus and ulna, and that between the radius and ulna. Nerves and blood vessels supplying the arm and hand are in close contact to bones and joints, and injuries to these often complicate fractures about the elbow joint. Injuries to these vital structures are often caused by the original injury but, unfortunately, they are often caused by incompetent, careless handling during the setting of the fracture. It is better to leave the fracture unreduced and let the fragments heal where they will than to have paralysis or Volkmann's Contracture result from rough handling in an attempt to get accurate anatomic reduction of the fractured fragments.

The joint between the radius and ulna which gives us pronation and supination of the forearm is so closely associated with the elbow joint proper that its function must always be considered in the treatment of these fractures. In dealing with a severe fracture where there is danger of ankylosis or marked loss of motion, the forearm should be immobilized in mid pronation and supination in order to secure a useful forearm.

Fractures at the elbow joint are usually caused by falls on the outstretched arm with the elbow slightly flexed so that the upward thrust is concentrated at or just above the elbow joint and is dissipated here when the fracture results. There are a number of different types of fractures, among them the following: 1. Supracondylar. 2. Diocondylar. 3. Inter Condylar. 4. Atypical T and Y. 5. Epiphyseal separations. 6. External on Internal Epicondylar. 7. External on Internal Condyle. 8. Capitulum. 9. Trochlea.

The prognosis depends upon the severity of the original fracture, the time element between the original fracture and the reduction, and tireless, skillful follow-up.

The diagnosis is made by inspection, careful palpation of the injured joint, and finally the X-Ray plate.

These fractures are emergencies and should be so treated. The old theory of waiting until the next morning or until swelling subsides should be no longer practiced. Swelling is caused by laceration and extravasation of blood into the soft parts, this in turn causes pressure on the nerves and blood vessels which in turn lessens or stops their function which results in partial or complete paralysis. As soon as the fracture is reduced hemmorrhage will cease, pain will lessen or stop entirely, and normal reparation processes begin.

Upon examining the patient one should observe the uninjured as well as the injured arm to determine individual characteristics. There is no need for heedless

haste. Careful observation and palpation will often make the diagnosis. Observe whether there is a nerve lesion. It is better to know whether the paralysis was the result of the injury or wonder afterward whether it might be due to your manipulation or subsequent treatment. If possible the elbow should be X-Rayed before any attempt is made to reduce the fragments. If possible these cases should be treated in a hospital for at least two or three days. Accurate records should be kept, not only for their scientific value but as a protection against possible litigation.

In small children general anaesthetic should be used. Most fractures at the elbow joint in older children and adults may be handled with local anaesthetic. Practically all fractures at the elbow except fractures of the olecranon should be treated in acute flexion. Following reduction, acute flexion locks the fragments in place and recurrence of the deformity is minimized. The triceps on tension acts as a posterior splint. Flexion restores the torn periosteum and tends to prevent excessive callus formation at site of fracture. Since the arm is more useful in flexion, it is better to start here. The weight of the arm and gravity will aid in obtaining extension. In most cases simply taping the arm in flexion with a bandage tied around the wrist and around the neck will suffice. Some surgeons prefer a posterior splint. No device should be used that will prevent observation of the whole arm at any time. The elbow should be immobilized for approximately three weeks. Then it may gradually be allowed to extend. The patient should be required to touch the thumb to the shoulder many times daily. Baking and massage should now be started, and only active exercises at first. Passive stretching should be used only after the fracture is solidly united and when active exercises have failed. Forceful manipulations with or without an anesthetic are dangerous in that more hemorrhage may result, which in time may cause further limitation of motion. Manipulation within the limits of pain can do no damage.

The ability to completely flex is easily lost unless constantly guarded against. Extension returns slowly and may require six months to a year and ability to completely flex and extend may never return.

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Abstracts

By John S. Coulter, M.D.

Traction-Suspension Treatment in Fractures—Certain Commonly Neglected Factors. Robert H. Kennedy, M.D., New York, N. Y., in J. Bone and Joint Surg., XV:2:320, April, 1933.

Delay before application of traction.—We believe that traction should be applied at the site of accident no matter if, at a later date, some other method should be substituted. Findlay of the Beekman Street staff has published the details of the routine which is used by our ambulance surgeons. As a result of following this plan, the roentgenographic examination which is made immediately after the patient reaches the hospital rarely shows overriding, and the muscles do not have a chance to go into spasm.

Lack of continuity of traction.—The emergency traction must be continued until the permanent method of treatment is instituted. Our resident surgeons are allowed to release the traction only if this is necessary to determine the site to be subjected to roentgenographic examination, after which it is immediately reapplied. The roentgenogram is taken with emergency traction in place. In the ward the clothes are cut away and the show removed under supervision of a surgeon and traction on the extremity is maintained manually whenever the hitch has to be loosened. The hitch is reapplied as soon as the extremity is freed of clothing.

Improper amount of weight.—There is no routine amount of weight for a given fracture. This depends on the site of the fracture, the amount of muscle damage, the length of time since the fracture occurred, the weight and muscular power of the patient. Intertrochanteric fractures of the femur and fractures of the upper third of the leg require less weight than fractures lower down in these bones.

The use of adhesive plaster.—Adhesive plaster is in common use as skin traction and works well within limitations. Zinc-oxid plaster should not be used, but a good grade of moleskin plaster. The part should be shaved, cleansed, and dried before its application. The plaster should start several inches above the site of fracture, unless that means crossing a joint. The theory that the plaster should start at the level of the site of fracture is a fallacy. In children under five years of age or of comparable size, overhead suspension by adhesive plaster for a fracture of the shaft of the femur gives excellent results.

Improper apparatus or improper use of apparatus.—There are many types of tongs, pins and wires which are good. Some have one advantage, others another; none is ideal. Better results are probably obtained by learning the use of one tong or pin thoroughly than by constantly changing as new ones are devised. Certain ones are absolutely to be avoided. One should not use the type of Steinmann pin which is made in two parts and screws together at the center. Such a pin is too weak. One was put in at our hospital by mistake a few years ago and it broke in the middle after a few days. Several months later an abscess developed in the center of the os calcis about a small piece of metal which had remained in. It is inadvisable to use tongs with long points. They are apt to pierce too far into the bone. We tried tongs in the malleoli for leg fractures for some time, but discarded this method several years ago, as the tongs were too prone to slip out.

Nursing care.—Interested nursing, with understanding of what the surgeon is trying to do, is absolutely necessary. It is impracticable to attempt to have every nurse in a hospital care for fracture patients. A person who will pay constant attention to details is needed.

Neglect of combined methods of treatment.—Methods of traction may and often do reduce displacements in fractures. But knowledge of this fact should not keep us from using manual reduction under anesthesia in combination with it in certain cases, particularly in the early hours of treatment.

The use of the x-ray.—It is questionable whether traction treatment should ever be used unless a portable x-ray outfit is available.

Care of wounds.—In fractures compounded from the outside, proper surgical treatment of the wound is essential until the danger of infection has passed. However,

traction sufficient to bring about the normal length of limb lessens the likelihood of infection by improving the circulation of blood and lymph and permitting the soft parts to resume their normal relations. In the care of wounds made by tongs and pins, dressings, when necessary, should be done with meticulous care by one person only.

Physiotherapy.—One of the reasons advanced for the advantage of traction treatment over plaster methods is that it is possible to apply local treatment to the part. Too often this is neglected for the first week or two, the only time when it is of any particular importance. Local heat should be given frequently after the first twelve hours. Superficial massage should be commenced at least within twenty-four to forty-eight hours. By this method plus elevation of the part, a few days at most suffice to remove most of the evidence of swelling in the limb. If the use of heat and massage is delayed for seven to ten days, a long period of time may be needed to remove the swelling and its results. Passive motion should be discarded, at least until firm union is obtained. On the other hand, guided active motion must be encouraged from the first, for active motion is far more important than all the other methods of physiotherapy combined. The patient should also be instructed to exercise his three remaining extremities and neck and back muscles regularly each day, in order that his general muscular tone may be preserved as much as possible.

Removal of traction.—Traction should be continued until union is sufficiently firm to maintain the same position of the fragments after the weight is removed. It is preferable to maintain traction for too long a period than otherwise. If, after removal of traction, overriding of an oblique fracture, angulation, or fracture of callous occurs, a good result may be lost or the progress of healing set back many weeks, whereas traction for one or two weeks longer might have prevented this.

The Permeability of the Body to Infra-Red Rays. C. B. Heald, M.D., Physician in charge of the Physical Medicine Department, Royal Free Hospital. In British M. J., No. 3783, p. 54, July 8, 1933.

Discussion

These photographs can therefore be taken to establish the fact that infra-red rays of 7,000 to 9,000 Angstrom units can pass completely through the wrist and forearms. Also, as the source of energy was limited to a 100-watt lamp, and the sensitivity of the string of the galvanometer was only 3 mm. for 3 millivolts—that is, one tenth of the sensitivity used in taking heart tracings—that, with greater incident energy and increased sensitivity of the galvanometer, thicker parts of the body than the forearm should be capable of penetration and the deflection of recording.

This preliminary communication is made in the hope that others will explore the wide field opened up by these records. Questions such as the following naturally occur:

Is there a "normal" for parts of a given diameter?

What factors influence variations from the normal other than physical thickness of the part—for example, age, sex, etc.?

Is there any variation in disease? For example, does an arthritis of one wrist produce a deflection different from that obtained by the wrist of the other side?

With increasing power and sensitivity of recording, what are the limits of thickness of the body to the passage of the infra-red ray?

Can anything be done to increase the speed and sensitivity of plates and films sensitive to these rays, and thereby obtain direct photographs?

Other questions also naturally suggest themselves, but I am endeavoring more particularly to obtain further information on questions 1 and 4.

Infra-Red Rays, Comfort and Health. Sir Leonard Hill, M.B., F.R.S., in British M.J., No. 3781, p. 1096, (June 24, 1933).

Conclusion

In considering the various baths used for stimulating the skin and producing curative effects, it is of interest to have found evidence of a reflex effect of a striking character. In my case the "nose-closing" effect is accompanied by a slight rise of blood pressure. In regard to heating and ventilating rooms, it is clear that where dark sources of heat are employed there should be adequate ventilation with cool air. This is required not only to produce comfort and a feeling of freshness, but to keep the atmosphere as clean as possible from dust and microbes. Incandescent lamps make such sources pleasanter. Electric fires can be improved by making them brighter sources of heat. A sensitive subject who suffers from nasal catarrh has been improved by replacing in his room a hot water radiator by a Ferranti bar fire which was made to take six amperes. Irradiated with this bright heat he works in comfort with a window open, and has better health. A modern gas fire would have done as well.

Vasomotor Response of Normal and Hypertensive Individuals to Thermal Stimulus (Cold). John Francis Briggs, M.D., Assistant in Medicine, University of Minnesota, and Harry Oerting, M.D., Assistant Professor of Medicine, University of Minnesota, St. Paul, in Minn. Med., XVI:7:481, July, 1933.

The study of vasomotor irritability and blood pressure response has been handicapped by the lack of suitable standard stimulus. Many methods of stimulation have been proposed, but owing to the complexity of these procedures, they have proven of little practical value.

Recently Hinea and Brown reported a study of the vasomotor response of some ninety-seven individuals to the stimulus, cold, and found that this stimulus resulted in an apparently specific response. If the validity of the results of the study can be proven, the test will be of inestimable value in ascertaining the vasomotor irritability of individuals as well as in determining the existence of pre-hypertension in individuals susceptible by virtue of these excessive vasomotor responses.

This investigation of the response of blood pressure to the stimulus, cold, was ascertained in 130 dispensary and hospital admissions. The subjects were at rest for a period of at least one-half hour, and in most instances for a longer period. At the end of the rest period the blood pressure was taken with the cuff on the left arm, and then the right hand was inserted up to the wrist in a bath of ice water. The blood pressures were then taken at thirty second intervals for a period of three minutes. The temperature of the ice water averaged 4.3 C.

Summary

The vasomotor response to the stimulus of cold was ascertained in 124 individuals. In addition, isolated responses of individuals suffering from various diseases were obtained. The number of cases studied is small, but in conjunction with the work of Hines and Brown, of Rochester, Minnesota, it seems that hypertensive individuals reveal an apparent specific type of response in both males and females. This response in the hypertensive patients is a more marked elevation of the systolic blood pressure, resulting in a curve of the plateau type.

Normal individuals also have apparently a specific response, which is shown by both sexes, in a rapid rise and fall of the systolic pressure, producing a peak type of curve.

The diastolic changes were not uniform nor specific in their character.

The mechanism producing the response is apparently reflex in origin, bringing about a generalized vasoconstriction of the arterioles with an exaggeration of the response in individuals predisposed to hypertension.

One patient in the series gave a response that we feel might be construed as a prehypertensive type of curve.

A study of the response of the patients with syphilis of the central nervous system indicates a marked exaggeration the cause of which is unknown, but may be the result of vascular changes produced by the disease.

If further study indicates that these responses are specific in character, this test will be of great value not only in the determination of etiology of heart disease, but in the recognition of those individuals who have latent or prehypertension and are poor life insurance risks.

Direct Internal Ultra-Violet Radiation to the Entire Genito-Urinary System. Samuel Lubash, from the Department of Urology, Flower Hospital Medical School, New York City, in J. Urol., XXX:2:231, August, 1933.

Having followed the work done by Caulk and Ewerhardt in radiation of the bladder with ultra-violet light, we thought it would be of interest if a device could be made whereby the entire urinary system could be given the benefit of the ultra-violet ray rather than being limited to the bladder. To do this two difficulties had to be overcome; (a) the quartz bulb to be applicable had to be small enough to pass through an operating cystoscope; (b) and a high frequency apparatus had to be used whereby the monopolar electrode could be employed for conducting such a current. With these thoughts in mind Mr. Vincent Wagner and Mr. Wm. Zenker were consulted and both of these handicaps were overcome. Ultra-violet radiation of the kidney, ureter, and bladder was then accomplished. As far as we can determine from the literature, we believe this to be the first time ultra-violet radiation of the entire urinary tract had been made.

Apparatus

In the accompanying photographs will be noted the internal ultra-violet applicator which is made small enough to allow for its passage through the systoscope. It merely consists of a No. 9 F. silk woven ureteral catheter through which is passed a piece of copper wire and has attached to its proximal end the quartz bulb containing mercury vapor and to its distal end a terminal. The bulb can be made of varying sizes and shapes depending on what its purpose shall be. To this completed arrangement we shall temporarily give the name of Internal Ultra-violet Electrode, for want of a better term at this time.

Application and Possibilities

For its application we find that the rays can be transmitted through a water medium (distilled) with only a loss of 5 per cent of its original energy values at a distance of 1 inch. Therefore, its use in the bladder, ureter or kidney pelvis in a water medium is not materially altered, and if so desired, air in place of water might be introduced into the bladder, by attaching an ordinary Luer syringe to the stopcock of the cystoscopic sheath, after thoroughly evacuating its urine content. Yet in the presence of water, the bulb can be placed directly to that portion of the bladder wall to which radiation should be given, and then even the 5 per cent loss can be cut down considerably. Besides under cystoscopic vision it may not be found necessary to irradiate the entire bladder but rather one particular section or ulceration may direct our attention. In that type of diffuse ulcerative cystitis where practically the entire bladder necessitates treatment, we have been inserting the catheter alone (large size bulb) without the use of the cystoscope, in a previously emptied and thoroughly washed bladder. Air may or may not be injected. Continued application of both principles will determine the better method. For the present our attention shall be directed to the following conditions: (a) a remaining tubercular kidney with secondary cystitis; (b) for tuberculous sinus tracts; (c) post-operative ulcerative tubercular cystitis. Time and extensive work will evaluate the true benefits, if any, that can be attributed to this new medium of therapy to such conditions of the genito-urinary system. Whereas only superficial rays could be previously given a sinus tract, now we can bring the rays directly into the depths of the entire tract. It is advisable that the tract be cleaned of its debris with saterile water before each application of the ray.

Dosage

We are not as yet in position to outline definitely a given dosage, either with reference to time or number of treatments. However, it can definitely be stated that no ill effects or serious results have followed over-dosage with light. As with light dosage to the skin, we watch for local and general effects on the part of the patient, as well as by repeated cystoscopic examinations for effects on part of the bladder mucosa. As yet no ill effects have been noted. Daily treatments for six consecutive days have been given, starting with three minutes and increasing it one-half a minute each day. The amount of energy values from the smaller quartz bulbs is made up increasing the time element.

Muscle Training in Industrial Injuries. By T. E. P. Gocher, M. D., San Francisco. Discussion by Harold M. F. Behneman, M. D., San Francisco; John Homer Woolsey, M. D., San Francisco, in California & West. Med., XXXIX:1:21, July, 1933.

A muscle is a part of the body that causes movement. This is caused by the contraction of the muscle. The muscle should be in good condition to give the best result. This "condition" can best be obtained by correct training and exercise. The condition of the muscle will depend upon whether the motor, sensory, and trophic nerves are intact and functioning in a normal manner, and that the muscle substance is also normal.

Results

Muscle training in itself is not often used alone, but in conjunction with other modalities excellent results can be obtained. Table 1 shows some of the results which can be obtained.

Treatment of Muscle Injuries

Treatment of muscle injuries is a study of importance. Unless this is done the disability period may be greatly prolonged and even a marked permanent disability result. In a series of cases I have found that if a muscle is kept at rest for two weeks or over, the average injured person loses control of that muscle. The muscle will then have to be trained to act in a correct and normal manner.

Heat.—Heat is frequently used in treating muscle injuries. One of the best sources for heat is from bakes. I have found that a good average time for this treatment is from fifteen to twenty minutes. Frequently heat is overused, and symptoms develop which may pro-

long the time of the disability. Heat causes a dilatation of the blood vessel of the area and improves the circulation. The radiant light tends to increase—the infrared to decrease—congestion that is deep. Heat should be applied to a muscle before giving training exercises.

Massage.—I find that overtreatment with massage is frequent. The first treatment to an injured area should be of a mild and gentle nature. Simple stroking is all that is frequently required. I have seen a heavy massage given to an injured area cause a patient to be laid up in bed for several days. Many times the aching, cramps, and tired feeling which overtreatment causes retard the healing of an injury longer than if no massage had been given.

Electricity.—Electricity correctly given is of great value. The "opening up" of the blood vessels and the electrical changes caused by the high frequency currents tone up the muscle and benefit it. The circulatory improvement is of value, as it brings nutrition to the injured area. The sinusoidal and faradic currents may be used to cause contractions and exercise muscles. They may be a benefit or a detriment to the muscles, depending on the treatment given. Muscles are easily overexercised and overtired if they are weak.

Exercise.—Exercise should be given to all muscle injuries. At first they should be mild and care taken that the weakened muscle is not overtired. It is easy to overexercise a weakened muscle. The exercises should be given in the following order: assistive, passive, active and, lastly, resistive. Certain phases may at times be passed over very quickly. In giving resistive exercises, only sufficient resistance should be exercised to cause a good firm muscle contraction. Do not overtire the muscle. A good relaxation should be obtained after each contraction.

The signs of an overworked muscle are: lowered tonicity, lessened irritability, spasm not easily caused and readily "give out." Exercise makes the muscles worse, and rest relieves them. There may be a diffuse aching and throbbing at times.

The signs of a toxic or rheumatic muscle are: increased tonicity, increased irritability; and spasm and cramps are easily caused. Exercise improves, and rest makes them worse. The muscle has a ready ability to contract. There may be a general aching present, which usually disappears following exercise.

Muscle Training

When training a muscle or group of muscles to obtain good control and strength, that area should be placed at rest in such position that no strain is placed upon the muscles. The muscle to be trained should be in a position of physical rest so that gravity will assist it in any motion requiring contraction. The patient should relax both mentally and physically.

When there is no active control the use of electricity can be resorted to. Whenever possible I prefer to use the faradic current that is obtained from a Bristlow coil. This is because of the excellent control that can be obtained from this current and the type of contraction obtained. The motor points of individual muscles can very readily be stimulated by this current and training given. The sinusoidal and galvanic currents may also be used. The progress of a muscle with training is often very slow until voluntary control is obtained.

In using the faradic current I first place the area at rest and in such a position that there is no strain on the muscles. I then demonstrate and instruct the patient in the movements that are desired. The motor point of the muscle is found and the minimum strength of the current is ascertained that will give a good contraction of the muscle. The muscle is then passively stretched several times. The patient is instructed to try to contract the muscles very slightly; and as he does this I apply the current through the area of the motor point and obtain only a slight full contraction. I find that when using the current this way I obtain better results than if I had used all full strength and caused a full muscle contraction. As control is developed I lessen the strength of the current until it is no longer needed, and a good active contraction can be obtained. The sinusoidal and galvanic currents may be used in a similar manner.

The patient must be instructed and have demonstrated the correct manner of performing his exercises at home. If he should not fully understand these exercises and the manner of performing them, the best results will not be obtained. Be sure to encourage him, and do not lose patience with him. Be careful, especially at first, that he does not overexercise.

Conclusions

Muscle injuries are very common, but good muscle training is an art that is possessed by only a few. Too often overtreatment is given, and as a result the disability period is prolonged. Exercise should be given mildly at first and not a 100 per cent work to the muscle. A weakened muscle may be called "paralyzed" when, if correctly exercised, it will be found to be able to actively contract. If the action of injured muscles is carefully studied out and appropriate training given, excellent results may be expected in practically every case.

A muscle may be considered "weakened" until it has a good full active contraction and a normal ability to relax well. This may take anywhere from a few days to many months to obtain. Remember, where there is contraction there is hope.

The accompanying table was made up by the author, following a personal study of twenty-eight patients receiving physical therapy in the main centers. All the points were carefully studied in each case. In each case the disability was prolonged, and an attempt was being made to ascertain the cause.

What the Orthopedist Can Do for the Arthritic. John P. Stump, M. D., New York, N. Y., in N. Y. State J. M., 33:16:998, Aug. 15, 1933.

Bed Patients.—The doctor and nurse must be taught to recognize beginning deformity; and when patients are in bed, it is most important that they be on the alert for the earliest signs of deformity and prevent this unfortunate complication. The bed should have a firm mattress which will not allow the body to sink into a bad position, as for example to allow the back to go into a position of flexion for hours at a time. The weight of the bed clothes should be kept off the painful joints. Frequently the pressure of the bed clothes will cause a foot drop. A cradle should be used; and if necessary a posterior molded splint can be employed to hold the foot in the physiological position. In the same manner a molded splint or cast can be employed to prevent flexion of the knee; a spica for the hip; and a spica or abduction splint for the shoulder. Remember to teach your interns and nurses to spot deformities at their inception.

Ambulatory Cases.—The first consideration in the prevention of deformities in ambulatory cases is posture. When you make a diagnosis of arthritis or you fear the onset of the arthritic state, immediately give thought to your patient's posture. Deformities are insidious in onset and their progress slow; and if you relent in your watchfulness for the shortest period, you are apt to find yourself confronted with a serious deformity which might have been prevented.

If the true importance of the feet in the treatment of arthritis is to be obtained the term "flat foot" must be abandoned, and weak feet used in its stead. Weak feet are feet which are rotated out of the weight-bearing line, hence causing unnecessary muscle strain which promotes fatigue, and in an arthritic further depletes an already weakened constitution. Furthermore, muscle strain actually weakens the resistance of the bony supports and causes improper points of weight-bearing in the joints, thus producing in the lower extremities, pelvis, and spine a most fertile field in which arthritis may flourish.

In the knees deformity is prevented by physiotherapy, which promotes motion and increases circulation. By physiotherapy I mean primarily diathermy and massage. In extreme cases braces will be needed to prevent flexion deformitv.

Deformity in the hip in ambulatory patients immediately calls for consideration of the foundation as described when considering the feet. One thing always to be remembered is that deformity of the hip, that is flexion and adduction, causes a tilting of the pelvis, which in turn promotes curvature and rotation of the spine, putting strain on that structure and decreasing its resistance to arthritis. The prevention of hip deformity is obtained by physiotherapy and, when necessary, braces. Deformity in the shoulders, elbows, wrists and fingers is prevented by physiotherapy and by braces. If fixation of the joints cannot be prevented, then employ casts and braces to hold the joints in the positions of optimum flexion for the patient.

Prevention of deformity in the spine should be one of our first considerations, because once a patient has a fixed, flexed, and rotated spine, medicine and surgery are helpless. Watch for the early flexions and fixations of the spine, prevent them by employing a support such as a Taylor spinal brace, and in selected cases use bony flexion.

Surgery offers absolutely no aid to a fixed, bony deformity of the spine and that is the first reason why every effort should be made to prevent spinal deformity. If any fixation is fibrous and not true bony ankylosis, the deformity might be overcome by manipulation under anesthesia; but if this is attempted it must be remembered that the bones have probably suffered severe atrophy of disuse, and that manipulation under anesthesia is likely to cause fracture or destruction of the bones.

Spinal Curvatures—Visceral Disturbances in Relation Thereto. Neville T. Ussher, M.D., Santa Barbara, in Cal. & West. Med., XXXVIII:6:423, June, 1933.

It has long been recognized that scolioses and other curvatures of the spine, with the attendant pathologic changes in and about the spine, have produced cutaneous pain along nerve pathways directly related to this curvature. So-called "intercostal neuritis," for example, has often been ascribed to a dorsal scoliosis of the spine. Cutaneous pain and sensory changes of the abdominal wall have also been recognized as being due in some cases to spinal misalignments, and a number of writers have described the effect of pathologic changes in the spine itself as producing radiation pain. For the most part they stress the cutaneous nature of the pain. Mayer describes certain sensory and motor radiation phenomena due to spinal nerve root inflammation (Dejerine's radicular syndrome) and differentiates the symptomatology from that produced by peripheral neuritis. Irritation of the spinal nerves as they leave the cord, whether within the confines of the bony canal or just outside of it, is shown to produce somatic disturbances in the levels enervated by these nerves. The term "radicular syndrome" rather than "radiculitis" is preferred by Nielsen in describing this condition since he recognizes the fact, as few apparently do, that the symptoms may arise from changes in the spinal configuration, or from a myositis relatively distant from the spinal roots. He does not deal with the sympathetic relationship, however. His emphasis on the correction of scoliosis in this type of case is a definite step forward.

Gunther and Kerr in recent papers have recorded very complete observations on the effect of osteo-arthritis on the spinal roots. They describe the result of this spinal-root irritation in the various segmental areas of the body. It was shown that the symptomatology was entirely dependent on the vertebral levels affected. Cervical involvement was associated with headache, "sore neck," and pain in the shoulders and arms. Precordial pain, often thought by the patient to be due to the heart, was found to be due to an osteo-arthritis of the upper dorsal spine. Pain in the gall-bladder and epigastric areas was noted when the middorsal area was involved. Appendicitis and pelvic disease were elements in differential diagnosis when the lower dorsal vertebrae were affected.

Carnett in 1927 investigated the follow-up reports of operations for chronic appendicitis and gall-bladder disease done by a large group of capable surgeons and found that a fairly high percentage of patients were not relieved by the operation. He stresses the importance of distinguishing between abdominal pain due to intercostal neuralgia and that caused by the appendix or gall-bladder. A brief mention is made of a girl whose "chronic appendix" and later whose apparently normal right ovary were removed with a return of right-sided symptoms after the operations. It was then found that she had a lateral curvature of the spine and shortening of one leg. When this condition was remedied her pain ceased and had not returned during the following six years. Carnett emphasizes the cutaneous disturbances, as most of the recent writers have done. However, he does not lay much stress on the intercostal neuralgias as being the direct result of spinal curvatures.

Of course there are innumerable cases where an individual has had some type of spinal curvature, even from birth, without developing radiation pain or symptoms of visceral pathology. It is my thesis, however, that in certain instances an irritation is set up about the spinal nerve roots or sympathetic ganglia near the spine. This irritation may be due to a local myositis, osteo-arthritis, bony malformation at the nerve canals, or possibly direct pressure on these nerves due to the angle of curvature. In turn, because of the intimate relationship of the sympathetic network with that of the somatic nervous system, a motor reaction may occur in the innervated viscus, such as spasm, and hypercontractility of the organ, or a sensory reaction may occur such as colicky pain, sense of fullness, inability to draw a full breath, etc. Theoretically, both the motor and the sensory phenomenon should often be found together.

From the above considerations it would seem possible, then, that symptoms of gall-bladder disease, appendicitis, stomach ulcer or gastritis, partial ureteral obstruction, colitis, spastic constipation, and other forms of visceral irritation may be produced directly or indirectly from a spinal curvature. It is my belief that a large group of individuals who have been treated or even operated for apparent visceral disease without definite relief may fall under this classification. These patients have usually "made the rounds" and the spinal curvature has often remained undiagnosed in spite of an otherwise complete medical examination. Roentgenograms of parts thought to be affected have usually been found negative, although

occasionally some spasticity of the gastro-intestinal tract or of a ureter may appear. These patients in general are frequently diagnosed "malingerers" or "neurotics" at best.

Summary

Inflammation of the spinal nerve roots and adjacent nerve structures has been described as producing cutaneous radiation pain simulating visceral disease.

Little consideration has been given to actual physiologic changes in the viscera due to such radiation phenomena.

The term "viscerospinal syndrome" is suggested to describe the result produced by spinal root and sympathetic nerve irritations at various segmental levels.

It is herein maintained that certain spinal curvatures such as scolioses, kyphoses, lordoses, etc., may produce definite visceral symptomatology and that this is not generally recognized by the medical profession.

Typical examples, selected from a group of twenty, are presented. In these patients symptoms of appendicitis, gall-bladder disease, ureteral colic, and other manifestations of visceral disease were apparently relieved by some correction of the spinal curvatures.

It is believed that psychalgias (as described by Pratt et al.) do not fill any important role in these patients.

Fatigue, age, activity, and the apex of the spinal curvature are shown to be chief factors in the production of the viscerospinal syndrome.

A plea is made for the general recognition of the role of spinal curvatures in the production of visceral disturbances.

A Note on Posture in Relation to Flat Feet. By L. E. Snodgrass, M.D., Philadelphia, Pennsylvania, Episcopal Hospital, Philadelphia, in J. Bone & Joint Surg., XV:3:787, July, 1933.

Flat feet occurring in patients with poor posture is an every-day observation. The emphasis in the past, however, has been largely directed toward the kyphosis part of the deformity in this relationship. The purpose of this brief paper is to stress the effect of the constant compensatory lordosis. These observations are based on a study of the anatomy involved, on the cadaver, and in the living.

For all practical purposes, it may be accepted that the pelvis moves with the lumbar spine. Lordosis is accompanied by rotation of the pelvis about a transverse axis drawn through the femoral heads, so that the iliac crests move forward and the symphysis pubis downward and backward. In this manner the upper attachment of the fascia lata to the pelvic brim is moved forward, and by its hammock-like function, which was clearly demonstrated by Allis in 1896, brings the great trochanter forward in relation to the pelvis in the standing position. This forward movement of the great trochanter is internal rotation of the leg.

The correction of the posture should be our first aim in treatment. Whether or not we regard the lordosis as primary, by its correction we will more permanently correct the flat feet than by simply bracing up the arches by shoes with pads or plates. The correction of the deformity in the foot should not be neglected, but the weight of the body and its leverage through the internal rotation of the leg will prevent a permanent improvement of the foot condition until the posture is corrected.

Thermic Treatment of Neurosyphilis. Samuel B. Haddon, M.D., and George Wilson, M.D., Philadelphia, in Pennsylvania M. J., XXXVI:11:829, August, 1933.

Read before a General Meeting of The Medical Society of the State of Pennsylvania, Pittsburgh Session, Oct. 6, 1932.

From the Philadelphia General Hospital, and from the Neurological Department, School of Medicine, University of Pennsylvania.

The physiology of fever induced by hot baths and diathermy is more easily understood. The elevation of temperature is brought about by paralyzing the heat radiation mechanism of the body. Diathermy without paralyzing heat radiation mechanism by the wrapping of the patient in heavy blankets and rubber sheets does not produce a rise in temperature. In elevating the temperature by diathermy, if the temperature is the all important thing the elevation can be produced by a few hot water bottles, a few blankets, and rubber sheets. By wrapping the patient in blankets and rubber sheets exactly the same as when diathermy is used but without turning on any current, we have been able to elevate the temperature just the same as if the diathermy machine were used. If hot water bottles, steamed blankets, and hot drinks were added, the rise in temperature was more abrupt and much higher. In very cold weather greater application of heat may be necessary to elevate the temperature. Many patients previously treated by diathermy volunteered that the treatment by simple paralysis of radiation of heat was attended with much less discomfort and was preferable to diathermy. In hot humid weather the temperature may rise abruptly and must be closely watched. The treatment by pure heat resolves itself into treatment by thermic fever.

All methods of treatment are attended with certain disadvantages. Malaria is a serious infestation and should be used only in young or middle aged persons. Its contraindications are: Tuberculosis, diabetes, cardiovascular disease, liver involvement, and cachetic diseases and severe anemia. In tabetics, malaria is badly borne and should not be used. If the outlined contraindications are recognized, the death rate can be reduced to almost nil. In the first year of the use of malaria, our death rate approached thirty per cent. At the Philadelphia General Hospital there has been no death from malaria in the last hundred cases. The indications for termination are cardiac weakness, rapid enlargement of the liver and spleen, severe anemia, and signs of kidney dysfunctions.

Typhoid vaccine is less dangerous than malaria and the contraindications are the same as those of malaria but less exacting. It has the advantage that the reaction can be more easily controlled by gauging the size of the dose and with experience this can be fairly accurately done. Furthermore the exact time and frequency can be arranged. It is often a good thing to give the patient a few injections of typhoid vaccine before malaris is used. Patients who are given typhoid vaccine frequently gain weight during the treatment.

Diathermy has few absolute contraindications. Only severe myocardial degeneration can be considered absolute. Burns not infrequently occur and prostration may occur if the operator is unskillful. Diathermy is difficult to give to violent and uncooperative patients, and not infrequently even previously cooperative patients become agitated and make satisfactory treatment impossible. Another considerable disadvantage of diathermy is the time consuming element. At least six hours are necessary for the proper administration of a single treatment. Two patients at the most can be treated simultaneously and as the treatments are given on alternate days four patients at most can be treated. When ten to fifteen treatments are given to each patient the number of patients that can possibly be treated is small and in large institutions such as the Philadelphia General Hospital the treatment be-

comes quite impractical. Since the elevation of temperature by the electric current does not have any advantage over elevation by other means we recommend hot water bottles and blankets.

In uncomplicated paresis, in which there are no contraindications, malaria is the treatment of choice. A remission rate of forty to sixty per cent may be expected. Malaria in the tabetic is attended with greater dangers and is an extremely painful procedure and should not be employed. Typhoid vaccine intravenously is our method of choice in the tabetic and used in those paretics in whom the risk of malaria is great; any form of induced fever is not without danger in tabes.

Diathermy and other methods of raising body temperature by paralyzing heat radiations are reserved for those in whom there are contraindications to malaria or typhoid vaccine.

No form of fever therapy is sufficient. In our opinion it should be followed by specific treatment, but not until two to four weeks have elapsed.

Summary

It can no longer be doubted that the forms of hyperthermic treatment are beneficial. They are all attended with dangers but with proper selection and care the mortality rate can be kept low. Malaria is our treatment of choice with typhoid vaccine intravenously, second choice. Thermic fevers by the various measures described should be resorted to only in cases in which the above forms are contraindicated. No form of fever therapy is sufficient.

In a broad general consideration of the contraindications to fever therapy in the treatment of paresis, it must be remembered that the disease unhealed by fever is hopelessly incurable by arsenicals (except tryparsamide), mercury and bismuth. If the contraindication is present against the use of malaria, the patient may be prepared for it by a few preliminary injections of typhoid vaccine or tryparsamide. The latter drug must not be used if eyeground or field changes exist.

The Effect of Short Radio Waves on the Biologic Activities of Some Bacterial Species. Marion M. Johnston, Ph.D., Toronto, Can., J. Lab. & Clin. Med., XVIII:8:806, May, 1933.

The discovery that an increase of temperature was produced in substances or animal bodies exposed to short radio waves has stimulated investigation regarding the possible application of this new knowledge to medical therapy. From the experiments undertaken data have also accrued, which are of more academic interest.

Summary

Heat generated by short radio waves had no effect on the colony form, pigment production, the biologic or some agglutinin antigenic properties of bacteria.

The virulence of bacterial species was not attenuated by radiothermy.

Short radio waves did not influence acute infections (such as pneumococcus may produce) to which mice are susceptible. Neither did exposure to radiothermy curtail a per os infection in vitamin deficient white rats.

Influence of High Frequency Displacement Currents on Bacteria. F. W. Fabian and H. T. Graham, East Lansing, Mich., in J. Infect. Dis., 53:1:76, July-August, 1933.

The influence of various forms of energy on life has always been an attractive field for the biologist. As soon as the physicist has made available methods by which these different forms of energy may be applied, the biologist has made use of them in his field. Thus, in turn, he has studied gamma rays, roentgen rays, ultraviolet rays and infra-red rays as well as light rays, all of which differ in wavelength. Beyond the infra-red are the longer waves of the spectrum used by the radio and now commonly called hertzian or electric waves. The vacuum tube has made possible short radio waves. The physicist has therefore placed at the disposal of the biologist a vast field of radiation, the possibilities of which have been but little investigated by him.

The region extending from the near infra-red to a theoretical infinity is so inconceivably vast that it would appear like a hopeless task to explore it. However, there are certain limitations due to mechanical and practical considerations that restrict the working field of the biologist to wavelengths of from approximately 1 to 100 meters. A thorough study of this restricted field would entail a considerable amount of work. In the present investigation three wavelengths, 20, 30 and 40 meters, were studied. The biologic influence of these waves on certain species of animals and on bacteria was studied. In this paper is reported only the work done with bacteria. Bacteria are ideal forms of life with which to study the more fundamental biologic aspects of the lethal effect of high frequency displacement current, since they are unicellular and simple in organization and reflect more nearly the fundamental character of the biologic effect of the dielectric in which they are placed.

Comment

It is apparent from these data that a frequency of 10 megacycles per second is by far the most effective frequency studied. This was true both for the animals studied and for bacteria. The data as given in figure 6 indicate that the reason for the greater effectiveness of the displacement current at this frequency was due to its ability to increase the temperature.

The nutrient broth used for the bacterial experiments had approximately 0.85 per cent sodium chloride and 1 per cent peptone together with meat extractives of unknown chemical composition. To this were added bacteria of unknown chemical composition. This solution and suspension constituted part of the dielectric of the condenser.

It has been shown by a number of investigations that heating of an electrolytic dielectric subjected to high frequency displacement current is a direct function of the salt concentration; likewise it varies for different salts at the same frequency. It has also been shown that there is a considerable difference between inorganic and organic salts as well as colloidal and noncolloidal material in their heating when made a part of the dielectric of a condenser in a high frequency circuit. When a solution such as was used is made a part of the dielectric of a condenser in a high frequency circuit, the disturbance in this solution is due to the potential difference between the plates of the condenser causing electronic or ionic displacement, which in turn produces heat.

Richards and Loomis have shown that the loss of power in a condenser having an electrolytic dielectric manifests itself as heat and is a function of the conductivity of the electrolyte and frequency of the current in the external circuit. A simple means of measuring the loss of power would therefore be to measure the heat produced in the dielectric.

The fact that the rise in temperature in the dielectric at 7.5 megacycles per second was less than at either of the other two frequencies studied indicates that the loss of power in the condenser was less. This would account for the observed lethal effect at this frequency. At a frequency of 10 megacycles per second the rise in temperature of our dielectric was greater than at 7.5 or 15 megacycles per second, which would indicate that the

loss of power was greater at this frequency than at either 7.5 or 15 megacycles per second.

The Treatment of Syphilis With Hyperpyrexia Produced by Diathermy. Norman N. Epstein, M.D., and S. Barre Paul, M.D., San Francisco, Cal., in Am. J. Syphilis, XVII:1:72, January 1933.

(From the Department of Dermatology and Syphilology in cooperation with the Department of Neurology of the Mt. Zion Hospital.)

The treatment of syphilis, particularly of the central nervous system, by the artificial elevation of the patient's body temperature, that is, pyrotherapy, has become an established practice. A variety of methods for elevating the body temperature has been employed, namely, inoculation with the parasites of malaria, relapsing fever, and rat-bite fever, injection of foreign proteins such as vaccines and the use of hot baths.

More recently diathermy as a means of producing hyperpyrexia was introduced by Neymann and Osborne. In this report we wish to state our experience with this method during the past two years.

Comment

The elevation of body temperature by means of diathermy is practical for the treatment of various forms of syphilis of the central nervous system. The results obtained by others and by ourselves indicate that this is a valuable adjunct in the treatment of this disease. The method is not without certain dangers, which can be avoided with skill in its application.

In the general hospital where our work was done, the severe types of paresis could not be controlled. Our patients consisted mainly of those with tabes dorsalis suffering greatly from gastric and rectal crises and lancimating pains.

Dementia paralytica, tabes dorsalis, taboparesis, asymptomatic central nervous system syphilis, meningovascular syphilis, and the Wassermann fast type of patient should be benefited by this treatment.

From an economic standpoint this method of pyrotherapy has much in its favor. The patient may be ambulatory, remaining in the hospital for only twenty-four hours. He is fit to return to his usual occupation the next day.

Summary

The results of treating a group of twenty-eight patients with various forms of central nervous system syphilis by means of hyperpyrexia produced by diathermy are reported.

Striking improvement was noted in thirteen patients with tabes dorsalis. The relief of pain was an outstanding feature.

Improvement was noted in patients with other types of central nervous system syphilis, but this was not as marked as in the tabetic group.

Serologic changes did not parallel the clinical improvement.

One fatality from the method is reported in a patient of advanced age, with marked mental deterioration.

Studies on the Physiologic Effects of Fever Temperetures. The Thermal Death Time of Neisseria Gonorrheae in Vitro with Special Reference to Fever Temperatures.

Charles M. Carpenter, M.D., Ruth A. Boak, Ph.D., Lawrence A. Mucci, A.B., and Stafford L. Warren, M.D., Rochester, N. Y., J. Lab. & Clin. Med., XVIII: 10:981, July, 1933.

Summary and Conclusions

The thermal death time of fifteen strains of N. gonorrheae was determined in vitro at fever temperatures of 30°, 40°, 41.5° and 42°C. Seven strains had been under cultivation for twelve years and one strain for ten years, while the remaining seven strains were isolated from one to four months prior to beginning the experiment.

The resistance of the strains of gonococci examined to the fever temperatures was variable. The cultures that were isolated ten and twelve years ago had, on the average, a longer thermal death time than the recently isolated cultures.

At 39°C. there was little, if any, effect on the growth of the organism. At 40°C. about 99.7 per cent of the organisms were killed by ten hours' exposure, while death of all the cells was not obtained at thirty hours in eight of the strains.

At 41°C., 99 per cent of the gonococci were destroyed in from four to five hours' exposure, while death of all the organisms required from eleven to twenty-three hours.

At 41.5°C. and 42°C., 99 per cent of the gonococci were rendered non-viable in two hours. The remainder were killed at 41.5°C. from seven to twenty hours, while at 42°C. the thermal death time varied from five to fifteen hours. In all instances the recently isolated cultures, with the exception of an "old" strain, showed the least resistance to 41°, 41.5°, and 42°C.

The in vitro thermal death time of N. gonorrheae is short enough at 41°, 41.5°, and 42°C. to suggest artificially induced fever as a valuable aid in the treatment of disease due to this organism. It is doubtful whether complete sterilization by heat can be obtained always from a single artificially induced fever of five hours duration.

A Course in Massage for the Student Nurse*

Outline Form by Dorothea M. Beck

Definition

Massage is the scientific manipulation of the soft tissues of the body to bring about a definite therapeutic reaction

History

a Ancient Chinese, Greek and Egyptian medical literature

b Ancient springs, modern spas, sanataria and hospitals

Place in Modern Medicine: Physical Therapy

a Electrotherapy—definition and generalities

b Hydrotherapy—definition and generalities

c Heliotherapy—true and artificial—definition and generalities

d Thermotherapy—definition and generalities

e Therapeutic Exercise—definition and generalities

Massage as a Profession

a Doctor

b Physical therapy technician

c Masseuse

d Nurse

*Three hours of lecture and twelve of practice.

1 Hospital routine
2 Emergencies and pioneer work
Fundamental Knowledge
a Review of general muscle groups—charts or drawings
b Review of circulatory, lymphatic and nervous systems
c Responsibility of the nurse as an agent for good
Purpose and Result of Massage
a Muscular and skeletal development
b Arterial, venous and lymphatic flow
c Nervous reaction
d Organic reaction and function of the skin
Indications and Contraindications: Doctors' Orders
Preparation for Treatment
a Patient
b Nurse
c Relative position between the two
d Massage media
Detailed Description of the Forms of Manipulation
a Effleurage, petrissage and friction from the standpoint of the nurse's need
b Technique of these fundamental forms and their variations
c Uses
d Vibration and tapotement (mentioned only)
Practical Application and Practice
a Local massage: hand, forearm, arm, shoulder; foot, lower leg, thigh, hip
b Preparation of the patient for the night; complete back massage
c Joint massage and anatomical movements—brief
d Abdominal massage—simple, brief, important
General working Rules and Conclusions

Note: In practically every hospital in the United States a brief course in Massage is included in the required curriculum, the number of hours depending on the state requirements. While it is imperative that each student have the greatest possible amount of time for practice it has always seemed wise to lay considerable emphasis on background. It is amazing to see how quickly the crude idea of a "back rub" changes before this and the details of technique. They understand their qualifications and limitations then and learn that Massage is a line of defense for certain emergencies which may present themselves during a nursing career.

Montclair, N. J.

A Short Note on Kellgren's Method of Movement Therapy*

By Annjuta Kellgren-Cyriax, L. R. C. P. & S. E., Physician in charge, Mechano-therapeutic Department, Elizabeth Garrett Anderson Hospital, London

The question often arises, "What is the difference between the Kellgren method and Ling's system of medical gymnastics?" The difference is not fundamental; Kellgren's method is only a further stage in the development of medical gymnastics on the lines of Ling.

Henrik Kellgren (1837-1916) worked under Branting (Ling's successor at the Royal Central Gymnastic Institute in Stockholm) and Hjalmar Ling (the son of P. H. Ling) who respectively represented the medical and educational sides of gymnastics, and thus belonged to the period of the older gymnasts. He assimilated their ideas and developed and improved them to such an extent as virtually to break new ground. He was gifted with a keen sense of movement, of form and of the aesthetic side of gymnastics. When giving exercises himself to patients, he performed them to perfection, and carried his patients and assistants with him in his enthusiasm for medical gymnastics and manipulations as a powerful method of healing.

His greatest advances were:

A.—His direct nerve treatment.

B.—Vibrations applied over large areas of the body.

A.—His direct nerve treatment falls into two groups, namely, stimulating and sedative. When one bears in mind the influence of the nerves in every part of the body on its nutrition and tone one is enabled to realize how many of its various functions can be influenced by treatment of the nerves controlling the same, either directly or reflexly. The stimulatory treatment consisted of manual nerve "frictions,"† either stationary (on the nerve trunk itself) or running (moving along the course of its distribution). The nerve supply of practically every muscle in the body can be reached directly by such frictions, and similarly almost every organ either directly or reflexly through those cerebro-spinal nerves that are connected to them via the rami-communicantes and the sympathetic. In addition, most of the sympathetic plexuses in the neck and abdomen can be stimulated directly. Thus by means of nerve frictions Kellgren was enabled directly to influence paretic and atonic conditions of all kinds, including many cases of deficiencies in secretion.

The sedative treatment consisted of manual vibrations and fine shakings applied either over the nerve trunks themselves or over their cutaneous distribution, just as with nerve frictions, and he specially employed them for neuritis, neuralgia, etc.

B.—Vibrations applied over large areas of the body. By their use Kellgren was enabled successfully to relieve pain and many acute conditions which ordinary massage would merely aggravate. Thus he applied them for inflammatory conditions such as fibrositis, conjunctivitis, laryngitis, pneumonia, traumatisms, etc. The pointing of abscesses was assisted by *centripetal* ("concentrating") vibrations around them and thereby resolution was promoted in wounds, particularly in those complicated by lymphangitis. The object of these vibrations in the foregoing was to drive the toxin back and out through its point of entry, and thus prevent a general infection by efficient localization. Gentle *pinching* vibrations were employed for synovial effusions: *suction* vibrations over the occiput for congestive headache, and below the heart to calm its action. Fine *shakings* were employed for tonsillitis, whereas coarser ones were used for bronchitis, etc., and in order to relax muscular spasm. During later years, in order to replace the manual vibrations, many

*Reprinted from the Journal of the Chartered Society of Massage and Medical Gymnastics, October, 1933.

†This word must not be confused with that form of massage that bears the same name.

mechanical appliances have been invented which, although useful in some cases, do not compare favourably with the vital hand and its sense of change and consequent power of adaptation.

Kellgren's technique when applying exercises or manipulations was to make use rather of his wrists and finger-joints than of his shoulders and elbows, thereby achieving a more even movement and a more elastic touch.

By making use of the powers of leverage, Kellgren modified and simplified many of the older forms of resisted exercises while fully maintaining, and even in some cases improving, their effect. He also instituted the use of continued traction during the execution of a movement: this not only increased its effect but if pain was likely to be caused by the exercise, as for example, by the friction between inflamed articular structures, this traction greatly reduced such pain—in many cases even entirely eliminating it.

A form of treatment of which Kellgren did not approve was prolonged massage, especially the so-called "general massage." He maintained that it tired the patient unnecessarily and that much better results were to be obtained by very short (1-2 minutes) energetic petrissage followed by various joint movements. An exception to this were his abdominal manipulations which were a thing apart, and might be administered during a period of 10-30 minutes.

Kellgren's petrissage was somewhat different from the kind usually employed: he wished to influence the deeper structures, and therefore used no lubricants, preferring a soft, loose garment between his hands and the patient. Kellgren's abdominal manipulations were directed at individual organs in the abdomen and pelvis through the abdominal wall. In the treatment of colonic stasis his object (excepting in rare instances) was *not* mechanically to propel onwards the scybala, but to stimulate the colon to do this for itself.

The efficacy of Kellgren's vibratory treatment was very great and attracted so much notice, to the exclusion of the rest of his methods, that many persons came to believe that these vibrations were the only form of treatment employed by him. This is quite a mistake as few medical gymnasts employed more active (including resisted) movements than he did.

To-day Kellgren's treatment is still giving such excellent results in suitable cases that it would, in my opinion, well repay investigation by physiotherapists.

The Role of Imagery in Connection With the Training in Relaxation*

By Theodore A. Bretscher, New York

This paper will have very little significance for the reader unless he catches and thoroughly appreciates the point of view from which it is written. It should be remembered that we do not pretend to give an objective scientific analysis of problems. Its purpose is threefold. First, the attempt to somewhat critically elaborate certain mental processes as seen from the subjective or inspective point of view of the author. Second, to give the objective scientist, whether he be a neurologist or experimental psychologist, an opportunity to correlate some of these subjective datas with his objective findings, if this is at all possible. Third, to give certain suggestions as to method and technique through which a further accumulation of psychological datas may be partially realized.

The history of a spastic or birth-injured patient is primarily composed of datas derived through physical, x-ray and laboratory examination. Very little has been done so far in the line of gathering such psychological material which might give us a better appreciation of a patient's general point of view or attitude. The psychological data which are at our disposal, usually are of such a nature that they tell us little of the individual's mental and emotional life. The reason for this seems to lie in the fact that the method used by experimental psychology is primarily patterned after the methods used in natural science. That is, it is concerned in giving an account of the genesis and forms of overt behavior. However, this does not in any way imply that such datas derived through a bona fide objective method are to be discounted. Quite the contrary, datas gathered through behavioristic analysis, as for instance, by testing general mental and motor ability, may be of great service, provided it is possible to supplement this method by a deeper and more comprehensive analysis of the patient's psychological make-up.

The physician as well the technician constantly appeal to the patient by way of some form of imagery. Unless they have somewhat of an appreciation of the patient's habitual mode of ideation or imagery, their appeals in the way of suggestion are apt to fall on deaf ears. As commonplace and self-evident as this may seem on the surface, it is so often forgotten even by highly trained and experienced physicians and technicians. To suggest, for instance, a rural scenery to an individual who has spent his whole life in city apartments, certainly would not make the individual very responsive to the suggestion. Illustrations of this sort may be easily multiplied by anyone who thinks a little critically on the subject. The desirability of a method or technique whereby we can gather more information on the general mode of habitual ideation and imagery seems to be obvious. So much for the general mode of habitual imagery or range of ideas.

The second phase of the problem is concerned with the specific type or nature of this imagery. It deals with the particular sensory qualities of the image rather than the image or idea itself. The first is chiefly concerned with the patient's general field of interest or range of ideas in order to make our appeal in the way of suggestion more effective. Here, on the other hand, we are interested in the particular sensory quality of imagery or ideas.

A study of the particular qualitative type of imagery seems to be important for several reasons. First, it would tend to make the type of suggestion used by the technician or physician more effective, insofar that the patient will more readily experience and carry out what has been suggested to him. Secondly, a study of the type or nature of imagery would include the problem

*Read before the A. P. A. convention June, 1933.

as to the training of muscle sense which is so important from the point of view of relaxation. Third, the problem of the nature or type of imagery is intrinsically bound up with the broad and general problem of attention. In this paper we shall briefly discuss the first two points.

There is a wide variation in the particular nature of qualitative imagery. Some people tell us that they are unable to recall an image or idea without some form of auditory ring, while most people are visual-minded. The reason why most people are visual-minded probably lies in the fact that sight tends to monopolize our attention more than any other sense quality; hence, our habitual perspective of the world is primarily in terms of visual imagery. To the layman, the idea of shape and form is always translated into visual terms. And, since no sensation is perceptible until it takes on some pattern form, other sensory qualities, as for instance, those originating in the viscera, muscles, etc., remain for the most part a diffused and undifferentiated mass without any specific shape or form.

The old introspectionist-psychologist made a great deal of the distinction between the content or matter of thought, on the one hand, and the processes of ideation or sensing, on the other. The felt muscular and neural tension, in any act of mental concentration or attention, is sharply to be differentiated from the subject matter or content upon which concentration takes place. One need not accept the method or technique of the introspectionist, nor the theoretical implication, to see that this distinction, to a certain extent at least, is in harmony with actual experience.

"We see what we preperceive." The uncritical layman does not distinguish between actual perceptions and habitual perceptions. Even the highly sophisticated critic is in this respect no better, if not worse, than the uncritical layman. Our world is usually an habitual memory-world and not a world as actually perceived.

This same distinction also applies to imagery. Hence, we shall distinguish in the course of this paper between two types of imagery: *Perceptual Imagery* and *Memory Imagery*.

Memory imagery denotes the habitual content or material of thought which is the usual form through which we perceive our world. It is that form of imagery with which we usually associate things and ideas. It deals with definite concrete ideas or things, rather than with the processes involved in the actual act of perception. In perceptual imagery, on the other hand, the attention is not so much focused upon the static content of thought or perception, as on the actual processes involved in an act of perception. For instance, observe the two words: push and stretch. The words tend to arouse two imageries of an act. But note the difference. If you say, "push," the attention is immediately focused upon the static object on which the muscular exertion is directed. In other words, the word push is usually associated with a static, objective thing, which calls for some muscular exertion, and not upon the actual act of muscular exertion itself. To be sure, the word push, with some people, may be associated with the actual muscle strain, but even here we would find, on closer analysis, that, to a layman, this association with an actual muscle strain or act of a certain muscle is more a static type of imagery than an actual awareness of the sensation involved in muscular activity. A motor imagery may be of a static and dynamic variety. One may have a motor image, say, of exertion, or stretching, in which there is no real experience of what the word denotes, but simply a static generalized meaning. Now take the word stretch. It, too, may be associated in an individual, not with the actual denotation of the term, that is, stretching, but with a generalized static imagery of the visual variety, as for instance, with a mental picture of stretching a rubber band or other elastic objects. In this case, it would arouse nothing but a static or habitual memory image in the subject. Generally, however, if the object is to arouse in the patient an actual imagery of the muscle act itself, the term stretching is more apt to accomplish this than the term push, which obviously denotes the object upon which exertion is made rather than the exertion itself.

From the point of view of the physician and technician, this distinction between memory and perceptual imagery is very important for various reasons. In the first place, if the aim is to arouse actual perceptual imagery in a patient rather than a mere static mental picture which we have termed memory imagery, it is very important to take cognizance of the choice of words which are employed in the suggestion.

This implies, secondly, a somewhat deeper appreciation of the store and type of imagery through which a particular patient perceives his world.

Thirdly, it requires some training on the part of the patient to discriminate between a mere static meaning of the term and what the term really intends to convey to him. Take, for instance, such commonly used terms or phrases as, feeling of heaviness, drowsiness, etc. It is very doubtful whether these suggestions will have the intended effect upon the patient, unless there is some appreciation on the part of the patient as well as the technician of this distinction. The author, for instance, has found that invariably the suggestion of heaviness or drowsiness had very little of the desired effect. Why? These two phrases tend to arouse mere static imagery or meaning of the terms in the author, without his being conscious of an actual experience of heaviness or drowsiness.

This same distinction between memory and perceptive imagery has been touched upon by various writers. Jacobson, for instance, in connection with training in relaxation, speaks of the distinction of the matter or contents of thought and the experience of tension derived from various muscle groups. I have selected the phrase perceptual and memory imagery for two specific reasons.

In the first place, they denote two actual distinct forms of experiences. Secondly, since they sharply differentiate between two forms of experience, they lend themselves as a practical guidance in our observation and deduction.

Of course, this does not mean that the distinction between perceptual and memory imagery is to be taken literally as a description of our commonplace, everyday experience. Quite the contrary, perceptual and memory imagery alternate with the shift of attention. Probably, during the greater part of our conscious life, attention is arrested by an undifferentiated and diffused sensory mass rather than by concrete objects or ideas. The whole gist of the matter is that memory imagery occupies the field of attention as a concrete thing or idea. It is often called the content or material of thought. Whereas perceptual imagery is with most people a vague and undifferentiated sensory mass, which may, through a course of disciplinary training in inspective analysis, take on definite discriminatory pattern-forms.

An interesting observation in connection with this subject has been made by the author. He has always felt that he was very dull in discriminating kinaesthetic

sensations. For instance, the position of the hands or the fingers may be changed very much before he becomes aware of this change. The sensation from the muscles, joints, or tendons involved here requires a relatively high degree of intensity before they can be discriminated. It is not true, however, that the author has no sensation from those regions or areas where his perceptual imagery is dull. In reality, quite the contrary is the case. He experiences such an avalanche of sensory and motor pressure, that it seems to magnify, so to speak, the whole bodily frame, and in particular, the extremities. The hands, arms, feet and legs seem to grow so voluminous, that these limbs are literally felt as being in the way. This feeling of being flooded by a mass of sensory impulses gives rise to the exaggerated hyper-tension and spasticity. Hence, it requires a relatively high degree of intensity for isolated sensations to emerge above the mass of chaotic sensory impulses in order to cross the threshold of awareness. The failure to discriminate between minor sensory impulses may, in part, be due to the fact (at least the author feels that this is so in his case) that hypertension is accompanied by such a mass or flood of undifferentiated sensory impulses, that the finer impulses can only cross the threshold of awareness after attaining a relatively high degree of intensity. That is, the subject is unable to discriminate between these finer sensory impulses, because they are, so to say, smothered by an avalanche of sensation, which causes a confused state of awareness on the part of the subject.

The question whether such a patient can be trained to become aware of finer isolated sensory impulses out of the confused and undifferentiated sensory mass, would not only be an interesting experiment, but, also, may be of service to therapeutics in general.

Not only would this tend to break up and ease the intense sensory pressure coming in from all parts of the body,—hence being contributory towards relaxation,—but it would help also in the training of proper muscular co-ordination. This would mean, in other words, that suggestive appeal on the part of the physician as well as technician, would more readily have the desired effect upon the patient. That is, to put in our lingo, suggestion would tend to arouse actual perceptual images rather than mere static and habitual memory images.

To facilitate suggestions intended to arouse perceptional imagery in a patient, it may be helpful to teach him or her some of the elements of muscular anatomy. This would tend to give him or her a visual image of various muscle-groupings and their functional mechanism, through which the patient would be more apt to acquire an appreciation of finer muscle sense.

Our Work With the Birth Injured at the Neurological Institute of New York City*

By Mathea Boxeth

The problem of rehabilitation of the birth-injured child has received very little notice and consideration in the past.

It was largely with the aim of facilitating a more systematic research in this field that the Department of Re-education of the Birth Injured was organized. This department is under the direction of Dr. Earl Carlson and his associate, Dr. Walter Klingman.

In order to combine the physical and the mental training, an experimental school was organized with an enrollment of ten pupils. This school is under the supervision of Miss Sauter, of the Department of the Physically Handicapped of the Public Schools of New York. Her aim is to work out a suitable program to fit the individual child and also to cooperate in helping the child carry out the instruction outlined by the Corrective Department.

Our Corrective Department was organized last September, with myself as the only technician. I now have two full-time assistants. Our patients range in age from infants to almost middle age. Only cases of normal mentality are admitted for training.

The department also maintains a free clinic under the Neurological Department of the Vanderbilt Clinic one afternoon a week. Here patients receive guidance and outlines for home training for their specific condition. Students from Columbia Physical Therapy courses receive their training and act as assistants.

The Occupational Therapy Departments of the Neurological Institute and the Vanderbilt Clinic cooperate with the aim of directing the Physical training in such a way that the afflicted individual may acquire a dexterity in the performance of some act of craftsmanship.

Most patients are given physical training either individually or in groups of two. In group training, temperamental factors are important. Children, as we all know, are imitative. An excitable child, for example, will derive benefit from association with a child of the opposite temperament; one who is calmer and more cooperative. The calm child tends to have a relaxing effect upon the excitable child.

Environmental surroundings are of great importance. An unfamiliar room with a strange person giving the training tends to increase the difficulty of relaxation. Familiar environment, familiar people are conducive to relaxation, but the aim must be to gradually adapt or condition the patient to varied environments and programs of training.

Also, individual idiosyncrasies as to response and receptivity to suggestion and environment should be observed. Some patients respond to slow, rhythmic music; others to suggestive methods as soft-heavy-sandpile and pussycat—the latter appeals to children especially, as most of them know the softness of a cat.

Certain types of so-called emotional complexes quite often tend to aggravate the patient's physical condition. Patients are apt to build up various sorts of defense and compensatory mechanisms, hence, it is very desirable and often necessary to delve into the patient's psycho-social history in order to trace the source of his emotional conflicts. Perhaps it is a dislike for their body, or fear of injuring people with whom they come into contact in their bizarre movements, etc.

With respect to training in relaxation, it seems necessary to commence with and depart from the casually

*Read before the A. P. A. convention, June, 1933.

acquired habitual posture. The re-conditioning to the proper anatomical forms of muscular coordination and relaxation must begin from this habitual posture.

Supine lying to most patients is very difficult; hence, it is important for effective relaxation to train the patient to relax in a supine position. In some cases, the mildest form of effleurage massage given for the purpose of quieting, will help to produce relaxation.

An appreciation or awareness of muscle or kinaesthetic sense on the part of the patient is often conducive to proper relaxation; hence, it seems to be desirable on the part of the more mentally matured patients to receive some elementary instruction of the muscular mechanism in order to be able to discriminate isolated sensations of certain muscle groups.

With respect to the types of exercises, it is very difficult to lay down any set rules, since these exercises must be adapted to the individual case. The active exercise should be carried out with the least possible amount of overflow; that is, with just as little effort as it takes to produce a free and easy movement. It should commence with slow, coordinated rhythmic forms of exercise, beginning with the big group of muscles. Sometimes it is necessary with small children to passively assist them with these exercises until they are able to perform them themselves.

Better results are obtained if they can make the movements actively. One correct movement by the patient himself is worth more than many given passively, since the neuromuscular pattern is more readily established by active, muscular movement than by merely passive exercise.

First exercises should be non-weight-bearing exercises, gradually working up to sitting and walking exercises.

Patients with a great deal of athetosis combined with spasticity have an involvement of the synergic muscle groups as well as the prime movers. Very little can be accomplished in the form of exercise until the relaxation has been accomplished. Then the exercises should be in the form of games, rhythmic dancing, or exercises with the patient counting and establishing his own rhythm.

We find in individual cases that it is advisable to give exercises to the contrasted muscle groups in order that the patient can establish a muscle sense, and thereby more readily produce relaxation. Intermittent stretching of contrasted muscle groups only tends to increase the contracture unless the antagonistic muscles are relaxed, when some benefit can be derived from slight stretching.

Speech training may be given with exercises in counting, repeating rhymes, or the alphabet. This helps to detract the patient from the speech mechanism and gives relaxation of the chest and throat muscles.

Combine the visual with auditory imagery by having the patient perform his breathing and vocal exercises before a mirror.

Such points as fatigue, concentration on one form of training, or monotony must be taken into account. In cases which have a history of operative procedures and have flaccid muscle groups, we find it necessary to have splints or braces. Otherwise, they merely tend to make the patient depend upon the support, and not make an effort to use his limbs.

Since most of these cases have weak or pronated feet, properly built shoes are always advisable. High shoes are to be preferred.

Now, what can we say in the way of concrete results in our work? This depends a great deal on type of case, frequency of treatment, age, cooperation of child, parents and general home environments.

Take a case of diaplegia with both spasticity and athetosis involvement of all muscle groups, difficulty in speech mechanisms and respiratory organs. In this type of case where the child is completely helpless, progress is rather slow in comparison to a case of diaplegia with spasticity involving only certain muscle groups, and very slight athetoid movements, where the child is able to stand and sit with support, having only slight difficulty in speech. Yet, in the first type of case, after six months of daily exercise, probably the most encouraging result of our training lies in the fact that the patient gets the feeling of relaxation, without which effective training in coordination is impossible. The patient begins to assist in a few coordinated exercises. He is able to sit and hold his head up without support, shows less irritability, improved health and more effective cooperation.

On the other hand, in the second case, there is a marked improvement in general physical and mental health after six months daily training. This particularly shows itself in walking, sitting, speech coordination and rhythm. The patient is less dependent on personal assistance and is able to relax in a supine position for a longer time. His cooperation is good; he has better poise and ease in meeting social situations. This comes to play particularly in respect to school work. Teachers have commented on their improved ability to attention. This is undoubtedly due to the fact that the muscles are less tense and hence the child is less distracted.

It is difficult to devise a method of testing or measuring these results systematically. Moving pictures and still pictures have been tried, but they are not exact since it is impossible to get a pose of the child when he is at his best.

Our judgment so far is largely based on general professional observation, as well as on verbal reports from patients and relatives rather than objective measurements. Even in our professional observation, we are still in the kindergarten stage when it comes to the judgment of progress and results.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912

Of The Physiotherapy Review published bi-monthly at Mount Morris, Ill., for October 1, 1933.

State of New Jersey } ss.
County of Essex }

Before me, a notary public in and for the State and county aforesaid, personally appeared Dorothea M. Beck, who, having been duly sworn according to law, deposes and says that she is the editor of The Physiotherapy Review and that the following is, to the best of her knowledge and belief, a true statement of the ownership, management, and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, towit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Kable Brothers Company, Mount Morris, Ill.; Editor, Dorothea M. Beck, Montclair, N. J.; Managing Editor, Ida May Hazenhyer, Chicago, Ill.; Business Manager, Ida May Hazenhyer, Chicago, Ill.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) The American Physiotherapy Association—President, Margaret S. Campbell, Chicago, Ill.; Treasurer, Mabel Holton, Ann Arbor, Mich.; Secretary, Bess Searls, Chicago, Ill.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) NONE.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions

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DOROTHEA M. BECK, Editor.

Sworn to and subscribed before me this Fourth day of October, 1933.

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